

THE BLACK HILLS OF SOUTH DAKOTA
AND WYOMING

OTTO E. GUTHE

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INTRODUCTION

L YING more than one hundred miles east of the Rocky Mountain ranges the Black Hills rise from the gently rolling surface of the Northern Great Plains as an isolated mass of forested hills or low mountains (Map 14).¹ Distinct from their surroundings, the Hills have an insular quality which gives them an easily recognized regional unity. Basic to this unity is the relief of the area. High plateaus and peaks rise four thousand feet above the surface of the plains (Map 15 A). Their slopes support dense stands of pine, which, in contrast to the adjoining steppes, reflect the greater precipitation and more moderate temperatures of the higher elevations.² The insularity of the area is enhanced by the character and arrangement of occupance forms. Mining, ranching, lumbering, and recreation have combined to produce a distinctive cultural impress within the region.

The regional design of the Black Hills is composed of gross features which emerge from the blending of an intricate detail. The concentric arrangement of rock structure and surface features around the core of the eroded dome is the basis for the development of the major outlines of the region (Map 15 B), and the radial drainage pattern of consequent streams forms the skeleton for much of the detail of the regional scene (Map 16 B). The correspondence of the various elements of the landscape of this area with these major and minor lineaments can be brought out only by analysis.

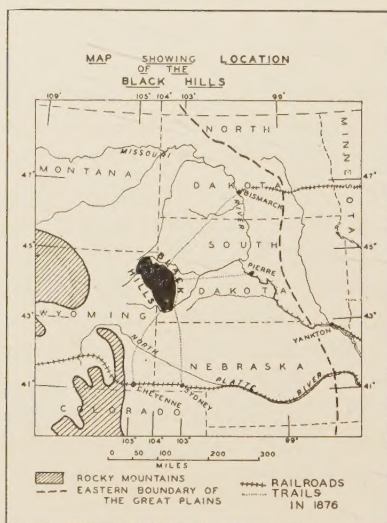
* The field work for this study was carried on during the summers of 1930, 1931, and 1932.

¹ The Black Hills lie surrounded by the unglaciated Missouri Plateau section of the Great Plains province of the Interior Plains of the United States. See Fenneman, N. M., *Physiography of Western United States* (New York, 1931), map.

² The Black Hills lie near the interior eastern edge of the BSk climatic region. Some stations within the Hills have Dfb conditions. See Köppen, W., *Grundriss der Klimakunde* (Berlin, 1931), pp. 128-129.

THE PHYSICAL BACKGROUND

The physical background upon which the forms of occupancy within the Black Hills have been impressed may be resolved into its significant component parts: the surface features, the drainage, the soil, the native vegetation, and the climatic characteristics. By close examination of the maps which accompany the text the correspondence of the various patterns of the physical background should become strikingly evident.



MAP 14

dome, and differential erosion of steeply dipping strata has formed a characteristic cuesta inclosing an inner lowland (Fig. 6; Map 15 B). The radial drainage pattern has resulted in the orientation of minor features at right angles to the gross features. Because of this great diversity of surface configuration it is possible to recognize several distinct divisions.

The Interior Basin

The rugged surface of the Interior Basin, which has in some places a maximum relief of about a thousand feet, lies slightly east of the axis of the main dome of the Black Hills (Maps 15 A, 16 A; Fig. 6). This basin corresponds in areal extent with the exposed crystalline core; its maximum length is some 60 miles, and its width

SURFACE FEATURES AND DRAINAGE

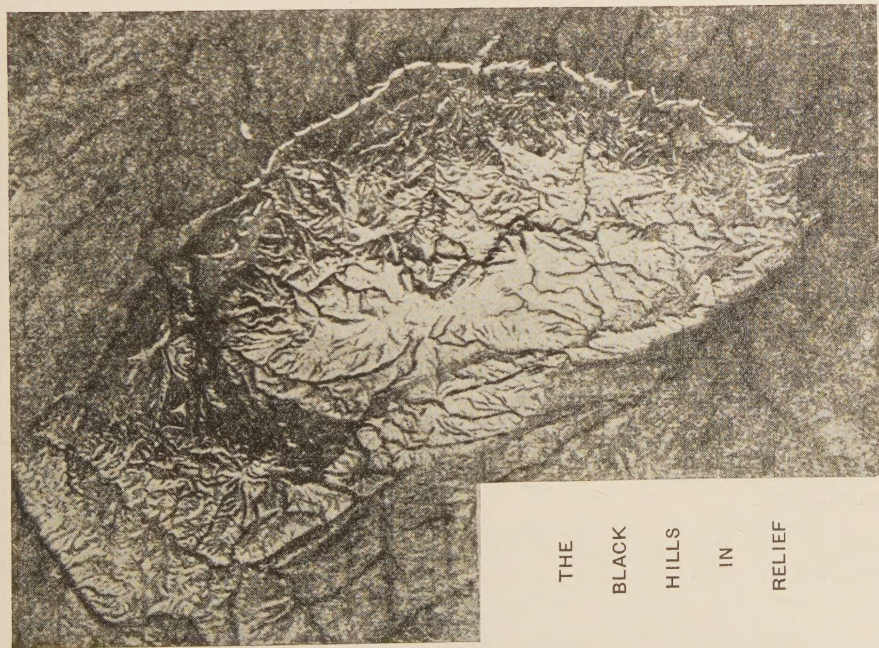
Geologically, the Black Hills are of a dome structure. The main uplift is flattish on top, steeply sloping to the east, but dipping gently to the west (Fig. 6). Its elliptical outline is accentuated by a secondary doming in the northwest. Mature erosion of the main uplift has exposed a crystalline core characteristic of such structures (Map 15 B). Limestone strata partly mask the more elevated portion of the



B

MAP 15

A



THE
BLACK
HILLS
IN
RELIEF

A. From a drawing by J. H. Renshaw and O. A. Ljungstedt, *Central Black Hills Folio*, U. S. Geol. Surv., *Geol. Folio 219*, p. 1, 1925

In no place exceeds 24 miles (Map 15 B). Three distinct types of surface configuration may be recognized. The first is a surface of high relief, underlain by a complex structure of granite, pegmatite dykes, and quartzitic schists. Granitic knobs and pinnacles dominate the scene, with their bare slopes rising almost perpendicularly from narrow ravines (Map 16 A).³ This type of surface lies in the southeastern part of the Basin and culminates in Harney Peak,

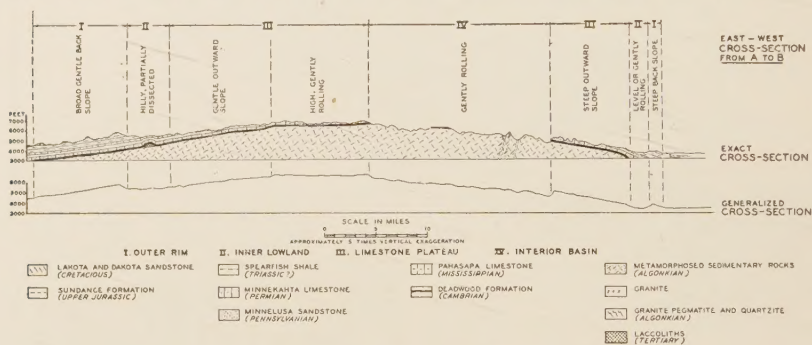


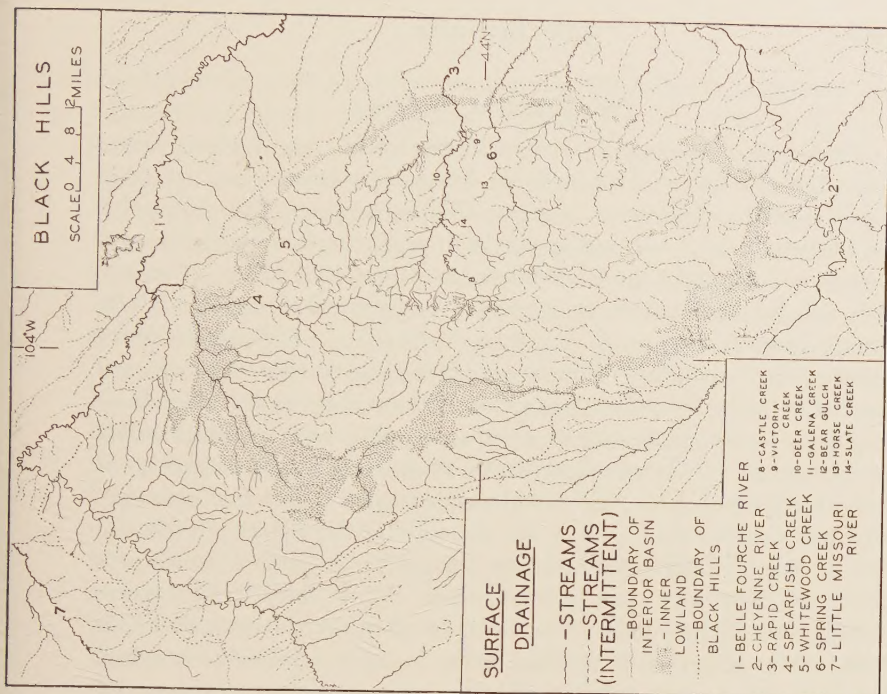
FIG. 6. See Map 16 A for the location of this cross-section. The exact cross-section is based on data from the U. S. Geol. folios 127 and 219. The generalized cross-section is simplified by the omission of noncharacteristic forms and some of the deeper valleys

which has an elevation of 7,240 feet (Pl. LXXVI, Fig. 1). The second, a surface of slight relief, underlain by weak slates and schists and characterized by mature ridges and broad, shallow, mature valleys, is found where the more active streams have not yet succeeded in cutting back into the surface formed during an earlier erosion cycle (Map 16 A; Pl. LXXVI, Fig. 2).⁴ The third, adjoining Rapid Creek, Whitewood Creek, and their tributaries, is a surface of high relief, also underlain by weak rocks, but deeply cut by vigorous youthful streams. High on the valley sides are shoulders which are remnants of the earlier cycle (Map 16 A).⁵ In general, the drainage lines cross at right angles to the axis of the Basin (Map 16 B).

³ Hovey, E. C., "Erosion Forms in the Harney Peak District," *Bull. Geol. Soc. Am.*, 11: 582. 1900.

⁴ Fillman, L., "The Cenozoic History of the Northern Black Hills," *Studies in Nat. Hist., University of Iowa Studies*, p. 23. 1929. See also Fenneman, *op. cit.*, p. 85.

⁵ Mansfield, G. R., "Post-Pleistocene Drainage Modifications in the Black Hills and Big Horn Mountains," *Bull. Harvard Coll. Mus. Comp. Zool.*, 49, No. 3: 58-87. 1906.

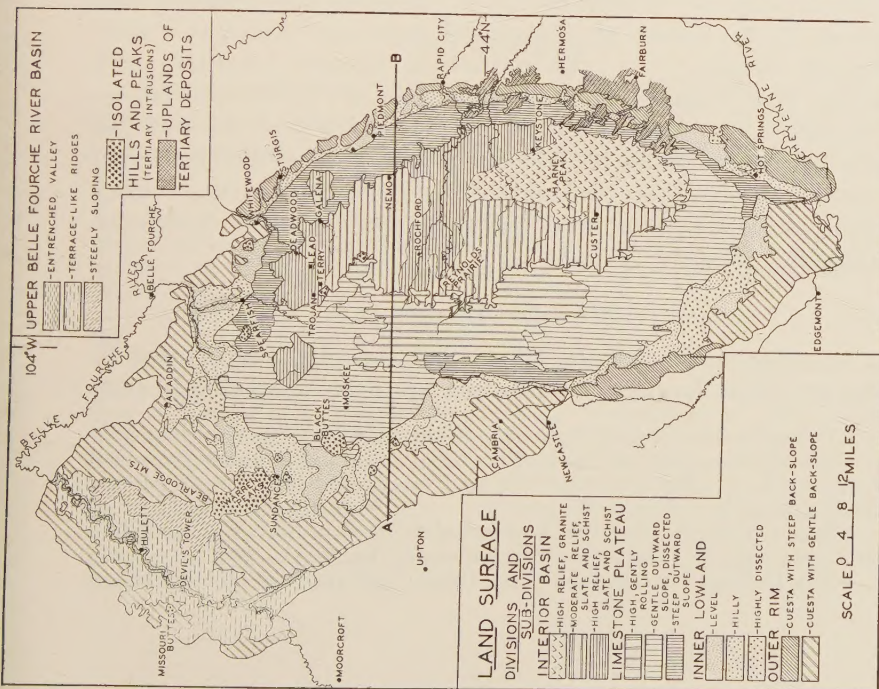


B

Map 16

A. Field data were compiled on maps of the scale 1:125,000

B. Data compiled from U. S. Geol. Surv. topographic maps of the area. The dates of preparation of the individual quadrangles vary greatly, so that there may be some slight error in representing the intermittent character of streams



A

The Limestone Plateau

Encircling and rising in places above all but the highest peaks of the Interior Basin, the Limestone Plateau presents a bold infacing escarpment averaging five hundred feet in height. The surface of the Plateau is not level, but slopes at first gently, then more steeply, toward the surrounding inner lowland (Maps 15 A, 16 A; Fig. 6). It is deeply dissected in its narrower parts by the streams which radiate from the center of the dome. Beveling of Paleozoic rocks has produced a banding of outcrops which may be seen as one passes from the Basin directly across the Plateau. A broad stretch of Pahasapa limestone is followed by an equally wide band of sandstone, but on the outer edge of the Plateau is the outcropping of resistant Minnekahta limestone, which forms a definite, although subdued, *cuesta* (Map 15 B).⁶ To the west of the Interior Basin the Plateau has a gently rolling surface related to the cycle of erosion to which reference has already been made (Map 16 A).⁷ Elsewhere, although the older surface may still be seen on the flattish interfluvies, deep gorges with vertical walls, in many places six hundred feet high, have given to the surface a very rugged appearance (Pl. LXXVII, Fig. 1). Where the dip is steep the outer edge is well marked by the *cuesta* of Minnekahta limestone, which is a conspicuous feature: "... the outflowing streams invariably cut through it a V-shaped gateway, making in the interstream spaces crescent-shaped scarps of the 30-foot limestone over the soft red sandstone that underlies it. The outer slope of the jointed limestone is usually washed bare and on the inner side of the Red Valley [Inner Lowland] forms what has been aptly called a tessellated pavement" (Map 16, A-B).⁸

*The Inner Lowland*⁹

An outcropping of weak Triassic red shale has been eroded to form the Inner Lowland¹⁰ which surrounds the Limestone Plateau

⁶ The sedimentary rocks outcropping in the Limestone Plateau range from the Upper Cambrian through the Permian Series. The Pahasapa limestone is of Mississippian age. The sandstone beds are Pennsylvanian, whereas the Minnekahta limestone is of Permian (?) age.

⁷ Fillman, *op. cit.*, p. 21.

⁸ Jaggar, T. A., Jr., *Economic Resources of the Northern Black Hills*, Part I — General Geology, *U. S. Geol. Surv., Prof. Paper 26*, pp. 16-17. 1904.

⁹ This Lowland was called the "Race Course" or "Raceway" by the Indians

and is given a distinct outer boundary by the infacing escarpment of a prominent cuesta (Maps 15, A-B, 16 A; Fig. 6). This Lowland is interrupted at only one point, in the southeastern section of the Hills, by Tertiary uplands which extend from the Plateau on to the plains as uneroded remnants of extensive deposition (Map 16 A). In width the Lowland varies from less than one mile in constricted portions to more than ten miles near Sundance. The major streams issue forth from the canyons of the Limestone Plateau and flow directly across the Lowland, escaping to the plains through water gaps in the cuesta (Map 16 B). As a result the floor of the Lowland is not flat, but is made up of a series of drainage divides, which are partly dissected by subsequent streams and separated by the broad alluvial flats of the consequent drainage lines. Three types of surface may be noted within the Lowland. The first is the level land, including the alluvial flats and a few extensive terraces some fifty feet above these flats (Map 16 A; Pl. LXXVII, Fig. 2). The second is composed of the hilly interfluve areas, surmounted in the northern portions of the Lowland by many flat-topped remnants of high terraces (Map 16 A; Pl. LXXVII, Fig. 2). The third, consisting of several areas of highly dissected land, gives a typical badland surface (Map 16 A).

The Outer Rim

A prominent cuesta, which rises conspicuously from the adjoining plains, forms the Outer Rim of the Hills (Map 15 A). It is underlain by resistant sandstone rock of Cretaceous age (Map 15 B) ¹¹ and

of the region, but was termed the "Red Valley" by geologists. Geographically the latter term is unsatisfactory because large areas within the Lowland do not exhibit red soil or red shale outcrops. Portions of its inner edge are underlain by limestone, and some of its outer edges are formed on Jurassic beds in which the red color is lacking.

¹⁰ See Richardson, G. B., "The Upper Red Beds of the Black Hills," *Journ. Geol.*, 11: 365-393. 1903.

¹¹ The resistant strata of sandstone which form the cliffs and upper surfaces of the Outer Rim are of Lower and Upper Cretaceous age and are the same beds that are exposed as hogbacks along the Rocky Mountain Front. See Darton, N. H., "Comparison of the Black Hills, Big Horn Mountains and Rocky Mountain Front Range," *Bull. Geol. Soc. Am.*, 15: 379-448. 1904. Usually the outer boundary of the Rim is along the contact between the Dakota sandstones and the shales underlying the plains, but exceptions occur. For instance, the sandy beds of the Graneros formation (dominantly a shale) at times rise with sufficient prominence and are closely enough associated with the Hills in aspect to be included within the Outer Rim.

presents an escarpment, in many places 600 feet in height, overlooking the Inner Lowland. The steeply dipping strata on the eastern and southwestern sides of the dome have given this Rim a hogback appearance with narrow lateral extent (Map 16 A). Elsewhere the more gentle dip has allowed broad back slopes, in places deeply cut by streams, which have formed wide valleys between flat-topped interfluves (Map 16 A). Gullying by resequent streams is at some points pronounced, and the cuesta is broken into many segments by the water gaps of the major streams (Map 16, A-B). North of the Tertiary intrusion which formed the Warren Peaks the cuesta is aligned in relation to the secondary dome which occurs in the northwestern section of the Hills. A 500-foot escarpment forms the western edge of the Bear-Lodge Mountains and overlooks the Upper Belle Fourche River Basin. From here the cuesta dips to the east and merges with that portion aligned to the main mass of the Hills.

Other divisions, not arranged concentrically with regard to the main dome structure, occur within the region and must be discussed.

The Upper Belle Fourche River Basin

"The valley of the Belle Fourche has been eroded in the flanks of a broad uplift. . . . In fact the rocks removed to form the valley hardly interrupt the gentle sweep of the skyline as one follows the profile of the land."¹² The present intrenched valley of the Belle Fourche with its low terraces is bounded on the east and west by high, dissected, terrace-like ridges, which are broken into flat-topped segments by the deep valleys of the streams tributary to the river. Between these ridges and the escarpments of the Outer Rim east of the Basin is a zone of steeply sloping land, intermediate in elevation and dissected by deep youthful valleys (Map 16 A). The drainage of the Basin is characteristically dendritic, and the interfluves send out narrow fingers between the tributary valleys (Map 16 B).

Isolated hills and peaks formed by Tertiary intrusions

The isolated hills and peaks formed by Tertiary intrusions are localized in the northern Hills (Maps 15 B, 16 A).¹³ They are,

¹² Russel, I. C., "Igneous Intrusions in the Black Hills," *Journ. Geol.*, 4: 34. 1896.

¹³ Many of the intrusions are so minor or so far advanced in erosion that they blend into the general surface of their surroundings and are not treated in this division.

apparently, all of laccolithic structure.¹⁴ In some the intrusive rock has become exposed by erosion; in others the sedimentary capping rocks still remain. The dominating Warren Peaks, the Missouri Buttes, Devil's Tower, and the Black Buttes are included within this division.

Uplands of Tertiary deposition

Remnants of Tertiary deposition cover small areas in many parts of the Hills, both in the older valleys and on the ridge tops. The greatest area of such deposits, however, is in the southeastern portion of the Hills extending from the Interior Basin on to the Plains (Maps 15 B, 16 A). Tentacles of these sediments stretch into the Hills along the old drainage lines and occupy saddles which lead to the Interior Basin. They reach their greatest breadth just outside the Limestone Plateau, where they form flat-topped ridges interrupting the continuity of the Inner Lowland.

Drainage characteristics

The streams, which have introduced the detail into these divisions, gain in volume as they flow through broad, shallow valleys near their headwaters. As they descend through deep gorges to the level of the Inner Lowland, much of the original flow seeps into porous sandstone rock, which forms an artesian reservoir for the surrounding plains. Crossing to the Outer Rim, they reach the Plains through water gaps, but here, also, the sandstone strata underlying the Outer Rim greedily takes as much of the remaining flow as possible, so that many streams disappear from the surface. The streams of the northern Hills are larger and more constant than those to the south. Even the larger valleys in the south exhibit dry stream beds during several months of the year. The Belle Fourche and the Cheyenne rivers encircle and seem to hold the Black Hills in their clasp, secure because of the extending tentacles which reach into the very heart of the region (Map 16 B).

The mold

The major lineaments of the surface, recognizable in the preceding divisions, form the gross features of the mold to which the broad

¹⁴ See Jaggard, T. A., Jr., and Howe, E., "The Laccoliths of the Black Hills," *U. S. Geol. Surv., Twenty-first Annual Report*, Part III: 163-303. 1901.

distributions of the significant forms of the landscape of the Black Hills are shaped. The drainage pattern, a more detailed part of the design of this mold, is the unifying bond for the areally less important, but nevertheless striking, details of the areal scene.

OTHER ELEMENTS OF THE PHYSICAL BACKGROUND

The patterns of soil, native vegetation, and climate show a distinct tendency to conform to the design of the mold. This correspondence is most striking in the case of soil, less so in respect to the native vegetation, and least noticeable, except for the broader aspects, in respect to climate.

Soils

The distribution of the edaphic conditions is genetically related to the surface configuration and to the distribution of the significant features of the geognosy of the area. Of greatest areal importance are the residual soils which are found on the interfluves. These soils are arranged concentrically around the exposed core of the main uplift and, in detail, around minor domings within the region. Being immature, they vary greatly in composition and texture, since they are a reflection of the underlying geologic materials.¹⁵ Where it is of sufficient depth, the soil derived from the crystalline and limestone rocks is highly productive. That derived from the sandstone is of too coarse a texture and is too easily eroded to be widely cultivated. The shale, especially that of the Inner Lowland, has weathered to a clayey loam, generally too compact to favor tillage. It can be worked only under a closely restricted range of moisture conditions, so that crop yields on it vary greatly from year to year. In the swales, where moisture is more reliable, cultivation is generally successful.

Alluvial soils, forming narrow bands along most of the streams, broaden in lateral extent where the major streams cross the Inner Lowland. They are distributed, therefore, in a radial fashion in accordance with the drainage pattern. It is on these soils that agri-

¹⁵ It must be kept in mind that "when the strata comprise alternating beds of different materials, such as shales and sandstones alternating with limestone, there are abrupt transitions in the resulting soils, which may differ widely in composition and agricultural capabilities in zones that lie side by side and are too narrow to map." See Darton, N. H., *Central Black Hills Folio, U. S. Geol. Surv., Geol. Folio 219*, p. 32. 1925.

cultural production reaches its greatest concentration, especially where irrigation can be practiced.

The pattern of the native vegetation shows a close correlation with these distributions but also reflects in a more general way the varying aspects of climate.

Native vegetation

The vegetation of the Black Hills is composed of elements which are now largely disjuncts, with the exception of the flora characteristic of the Great Plains.¹⁶ During earlier periods plants from the west, east, north, and south advanced into the Hills, and now remain associated together within the region, but separated from their respective areas of widespread occurrence.¹⁷

The three major vegetational climaxes of the United States — grassland, scrub, and forest — present a very definite pattern within the Hills. The Interior Basin is dominated by medium to dense stands of western yellow pine (*Pinus ponderosa scopulorum*) associations. The higher portions of the Limestone Plateau are similarly covered (Map 17 A). Several types of breaks occur in this pine forest. Some align themselves with the streams and follow the drainage patterns rather closely where the valleys are broad and shallow. A zonation from willow and prairie grassland along the streams gives way to an aspen (*Populus tremuloides*) growth bordering the dense stands of pine on the ridge slopes (Pl. LXXVI, Fig. 2; Pl. LXXVIII, Fig. 1). Breaks of another type are locally extensive. So-called upland prairies, such as the Reynolds Prairie, are grasslands of the mixed prairie association entirely surrounded by forest (Map 17 A).¹⁸ A third type of break is seen in the large burns, which are a common sight in the interior (Map 17 A; Pl. LXXVII, Fig. 1).¹⁹

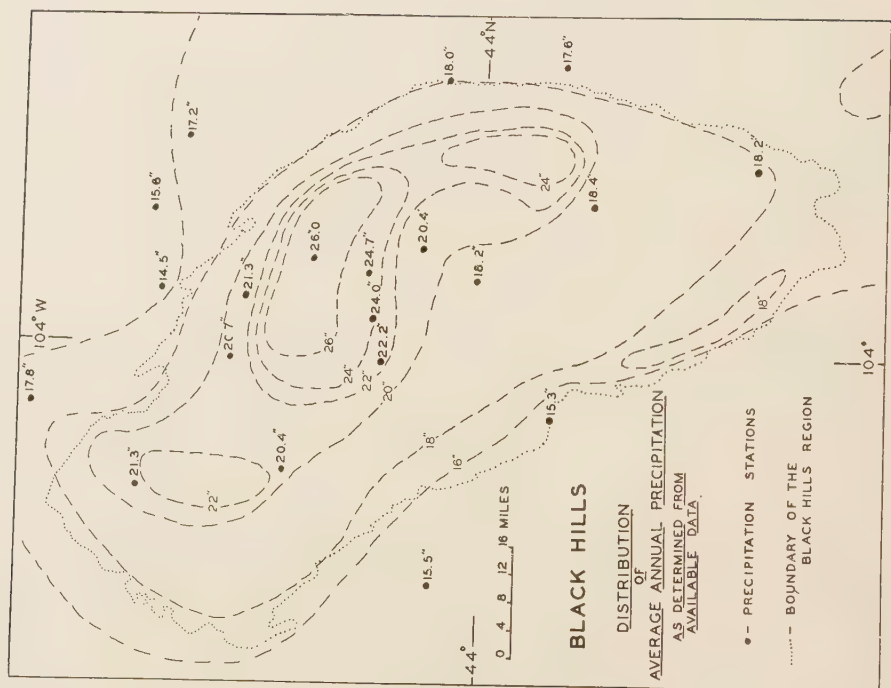
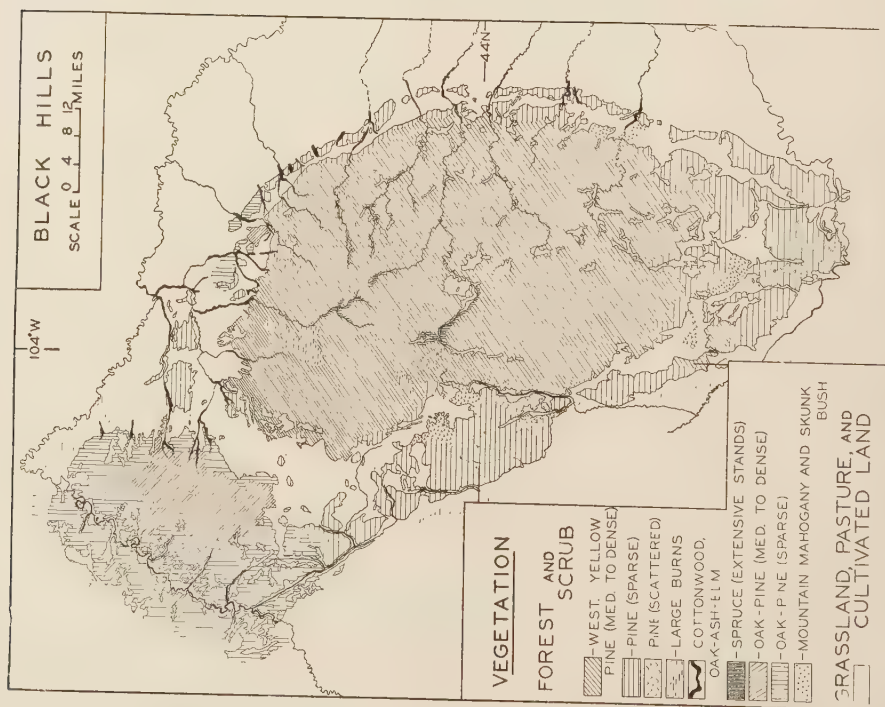
On the outer lower slopes of the Plateau bordering the Inner Lowland sparse stands of pine and scrub growth are characteristic. The Inner Lowland itself is conspicuous because of its grasslands (Pl.

¹⁶ Shantz classifies the native vegetation of the surrounding plains within the Short Grass (plains grassland) division. See Shantz, H. L., and Zon, R., "Natural Vegetation," *Atlas of American Agriculture*, U. S. Dept. of Agric., Part I, Sec. E, maps. 1924.

¹⁷ McIntosh, A. C., "A Botanical Survey of the Black Hills of South Dakota," *The Black Hills Engineer*, 19: 198. 1931.

¹⁸ *Ibid.*, p. 207.

¹⁹ Jenny, W. P., and Newton, E. M., *Report on the Geology of the Black Hills of Dakota*, U. S. Geol. and Geol. Surv. (Washington, 1880), p. 322.



MAP 17

A. The legend indicates dominants in associations which are conspicuous in the landscape. Differentiations are based on striking contrasts in visual aspects. The distributions are generalized from field data placed on maps of the scale 1 : 125,000

LXXVII, Fig. 2), but it is hemmed in by the scattered, gnarly stands of western yellow pine which cover the higher portions and the back slopes of the Outer Rim. To the north bur oaks (*Quercus macrocarpa*) become codominant with the pine, especially in the Upper Belle Fourche River Basin (Map 17 A).

Characteristic transitions can be recognized on the valley floors as one proceeds from the plains toward the headwaters of the major streams. First are seen the cottonwoods, which form narrow belts rising conspicuously above the steppe of the plains and of the Inner Lowland. Many hardwoods, such as oak, ash, and elm, form dense stands at the entrances to the canyons cut in the Limestone Plateau. In the more rugged portions of the Hills aspen and paper birch (*Betula papyrifera*) choke the narrow valleys, but grasslands and willows border the streams which meander through the broader valleys. Near the headwaters of these streams spruce (*Picea canadensis*) covers the north-facing slopes and may extend down to the immediate stream bank (Map 17 A). The detail in the distribution of the vegetation corresponds, therefore, with the drainage pattern and its relation to the minor features. The variations in soil characteristics, so closely related with surface, show marked relationships with vegetation distributions, especially along the boundaries between recognized associations. The fine, deep soils and clays are usually devoid of tree growth, as in the Inner Lowland. Sandy or rocky soils tend to support trees if climatic conditions allow, as on the slopes of the Outer Rim and the rocky lower slopes of the Limestone Plateau.²⁰

Climate

The general features of the climate of the Northern Great Plains show the Black Hills to be climatically distinct from the surrounding steppes. Outside the Hills conditions are definitely semiarid; in the interior of the region humid conditions of equal distinctness are found. Hence, the climate of the area may be characterized as a transitional zone through which more and more humid conditions are noted as the center of the Hills is approached.

Over 75 per cent of the annual precipitation takes place during the growing season. At Belle Fourche, the station having the least average annual rainfall for the surrounding area, the total precipi-

²⁰ Hayward, H. E., "Studies of Plants in the Black Hills of South Dakota," *The Botanical Gazette*, 85: 399-400. 1928.

tation is 14.54 inches. The maximum recorded average annual precipitation, 25.98 inches, occurs at Lead (Table I). The general rainfall pattern, as indicated by isohyets of average annual rainfall, tends to present a roughly elliptical shape, although offset to the northeast. A marked concentration is shown in the northeastern portion of the Hills (Map 17 B). The effect of this distribution is seen in the flow of streams as well as in the density of forest growth.

Elevation and forest cover diminish the annual temperature range and the length of the growing season. The ranchers and the National Forest Service recognize three zones. The highest, lying between 6,000 and 7,000 feet, primarily upon the high Limestone Plateau west of the Interior Basin, has a three-month growing season, and agriculture is carried on with difficulty. Only the hardier grains and timothy hay can be grown. Most of the remainder of the upland area is included within the second zone, which lies between 4,500 and 6,000 feet. Here the growing season is about four months long and allows the more successful cultivation of small grains and vegetables. The third zone lies below 4,500 feet and extends on to the plains. The growing season is at least four and one-half months long, and all common grains, vegetables, and even corn can be grown.

Although a general correlation between vegetation and climatic distributions undoubtedly exists, in detail it seems to be largely overshadowed by variations in the edaphic conditions. Great variability in precipitation from year to year, coupled with the short duration and the irregularity of weather observations at most of the widely spaced stations within the area (Table I), do not allow one to draw conclusions regarding the relationships of climate and vegetation.

The physical background of the region, thus analyzed, was the setting which the incoming population of the Black Hills occupied and changed. The patterns resulting from this occupancy complete the areal scene.

THE CULTURAL IMPRESS

The entrance of man into this area has brought modifications in the details of the regional design, but the gross features remain unchanged. The first white settlers were attracted by the reports of gold, and before long placer and lode mining dominated the early

TABLE I
CLIMATIC DATA

Station	Length of record	Elevation (in feet)	Average annual precipitation *	Average annual temperature †	Average of three warmest months	Average of three coldest months
Lead.....	22	5,200	25.98	43.6	62.4	23.5
Spearfish.....	41-34†	3,600	21.29	46.3	67.0	25.9
Sundance.....	25-22	4,750	20.44	40.9	63.5	19.7
Oelrichs.....	40-33	3,339	19.45	46.1	69.4	22.5
Hot Springs.....	27-22	3,505	18.17	46.7	69.0	24.2
Rapid City.....	43	3,251	17.98	46.1	68.3	24.2
Colony.....	17	3,500	17.84	46.1	69.1	20.9
Hermosa.....	32-26	3,278	17.58	45.8	67.9	24.2
Vale.....	23	2,765	17.24	45.0	68.6	20.6
Ardmore.....	21-17	3,557	16.82	44.5	68.7	19.7
Orman.....	25-24	2,920	15.64	46.1	69.6	21.8
Upton.....	13	4,242	15.52	42.4	67.0	16.5
Newcastle.....	22	4,317	15.33	45.7	69.5	23.2
Belle Fourche.....	22	3,020	14.54	44.9	67.7	21.6

* Precipitation in inches.

† Temperatures in Fahrenheit.

‡ The first number refers to the length of precipitation records; the second, to the length of temperature records.

Data for all stations except Hermosa and Upton are from averages obtained from *Climatological Data for the United States by Sections* (U. S. Department of Agriculture, Weather Bureau), Vol. 17, No. 13 (1930): South Dakota Section, XXXV: 50-52; Wyoming Section, XXXIX: 54-56. For Hermosa see *ibid.*, Vol. 15, No. 13 (1928), South Dakota Section, XXXIII: 50-52; for Upton see *ibid.*, Vol. 14, No. 13 (1927), Wyoming Section, XXXVI: 54-56

cultural scene. On the heels of the miners came the ranchmen, followed almost immediately by the lumbermen, both groups eager to furnish the miners with supplies. At first these modes of occupancy were closely interdependent, but they have since expanded beyond their original restricted contacts. More recently tourists have introduced recreation. The widespread expansion of settlement characterizing the early years had proved much of the area unsuitable for ranching and mining, and abandonment of the poorer sites took place (Pl. LXXVIII, Fig. 2; Pl. LXXIX, Fig. 1), with a consequent concentration on the better areas.

THE COURSE OF SETTLEMENT

The course of settlement of this region by white people covers only a brief span of some sixty years, but during this time several different modes of occupancy have guided the settlement through successive periods of prosperity and decadence. The great wave of immigration into the Hills began in the late fall of 1875 and the spring of 1876, with Custer, the original discovery location of gold, as the objective point. At this time the population of the town was from 6,000 to 10,000 people.²¹ In the late spring of 1876 rich placer discoveries in Deadwood Gulch in the northern Hills emptied Custer of all but fourteen people. Deadwood, the center of activity in the northern Hills, sprang into prominence. Other mining camps experienced periods of hectic prosperity, but most of them are today abandoned or even obliterated. The main routes by which supplies reached these early prospectors were northward across the plains from the railroad stations of Sydney and Cheyenne, or westward from Bismarck and Fort Pierre (Map 14).²²

Soon after this rapid increase of mining within the interior of the Hills the spread of settlement was directed outward to the Inner Lowland and the skirting plains. Ranching became an important activity with hay cultivation and grazing of livestock dominant, and with the mining towns serving as markets. Some of the more important entrance towns to the Hills obtained their start at this time. Rapid City, Spearfish, and Sturgis were established in 1876-77 (Map 16 A).

²¹ Tallent, A. D., *The Black Hills* (St. Louis, 1899), 140-141.

²² Ayres, G. V., "Early Transportation," *The Black Hills Engineer*, 18: 12-18. 1930.

The population dependent upon ranching has shown fluctuations similar to those characteristic of all western South Dakota. Increases and decreases are related in time with variations in rainfall. In 1880 the population of the Black Hills and the closely adjoining plains was 16,726. The great boom period of settlement in the rest of South Dakota nearly coincided with the first years of expansion in the Hills — years of more than average rainfall. There followed a series of droughts from 1886 to 1897, and during this time Custer, Fall River, and Pennington counties, comprising a large part of the region, all experienced decreases in population. Well-established towns on the outskirts of the Hills showed similar decreases, as indicated by the accompanying table. Fluctuations in the mining population cannot be correlated with those of ranching areas, as is evidenced by the continued growth of Lead and Deadwood, supported by the booming mines of that period (Table II).

County	1900	1890	Town	1900	1890
Custer.....	2728	4891	Rapid City...	1342	2128
Fall River...	3547	4478	Hermosa.....	77	172
Pennington..	5610	6540	Hot Springs..	1319	1423
			Newcastle....	756	1715
			Sundance....	294	515

The decline in population described for the outskirts of the Hills was followed during the next decade by a rapid increase. This growth was probably due in part to a series of "wet" years and in part to the increased development of railroad communication and the resulting breakdown of isolation. It is true that railroad connections with the Black Hills were established by 1891. Two lines, one from the south proceeding directly through the center of the Hills and one skirting the eastern edge of the region, reached Deadwood in that year (Map 18 A). Towns, such as Piedmont, Whitewood, and Newcastle (Map 18 A), were born with the advent of the railroads at those points. The great impetus for development came in 1907, however, when the Chicago and Northwestern and the Chicago, Minneapolis, and St. Paul entered Rapid City from the east (Map 18 A).²³ From this time on Rapid City was definitely the trade center of the Hills and the focal point for all traffic eastward (Pl. LXXIX, Fig. 2).

²³ See *Board of Railroad Commissioners, State of South Dakota, Annual Reports* beginning 1889.

TABLE II
POPULATION STATISTICS
Counties

Year	Butte	Crook	Custer	Fall River	Lawrence	Meade	Pennington	Weston
1930	8,589	5,333	5,353	8,741	13,920	11,482	20,079	4,673
1920	6,819	5,524	3,907	6,985	13,029	9,367	12,720	4,631
1910	4,993	6,492	4,458	7,763	19,694	12,640	12,453	4,960
1900	2,907	3,137	2,728	3,547	17,897	4,907	5,610	3,203
1890	1,037	3,203	4,891	4,478	11,673	4,640	6,540	2,422
1880	....	....	995*	....	13,248†	....	2,244	....

Towns

Year	Belle Fourche	Central City	Custer	Dead-wood	Edgemont	Fairburn	Hermosa	Hill City	Hot Springs	Lead
1930	2,032	198	1,203	2,559	1,103	91	128	...	2,908	5,733
1920	1,616	199	595	2,403	1,254	..	74	...	1,697	5,013
1910	1,352	296	602	3,653	816	..	114	271	1,865	8,392
1900	451	....	599	3,498	479	..	77	...	1,319	6,210
1890	....	....	790	2,366	....	..	172	479	1,423	2,581
1880	....	1,008	271	3,777	....	..	...	...	....	1,437

Year	Moorcroft	Newcastle	Newell	Osage	Rapid City	Spearfish	Sundance	Upton	White-wood
1930	341	1,201	547	457	10,404	1,577	369	373	392
1920	420	1,003	414	...	5,777	1,254	328	306	339
1910	178	975	...	...	3,854	1,130	281	244	390
1900	...	756	...	...	1,342	1,166	294	246	311
1890	...	1,715	...	...	2,128	678	515	...	443
1880	...	....	...	...	292	170	...	...	...

* Includes the present Fall River County.

† Includes portions of Butte, Meade, and Pennington counties.

Data from *Census of the United States*, Nos. 10-15, United States Department of Commerce, Bureau of the Census

The urban populations of the well-situated towns advanced during the decade from 1910 to 1920 (Table II), probably in part as a result of this better transportation and an increase in trade, but the rural population decreased. The ranchers experienced three years of drought near the first of the decade and recognized the advantages of enlarged farms, the application of dry farming methods, and an increase of stock grazing.²⁴ During the same period the mining centers of Lead and Deadwood showed marked declines, for many of the large mines of the area were closed down.

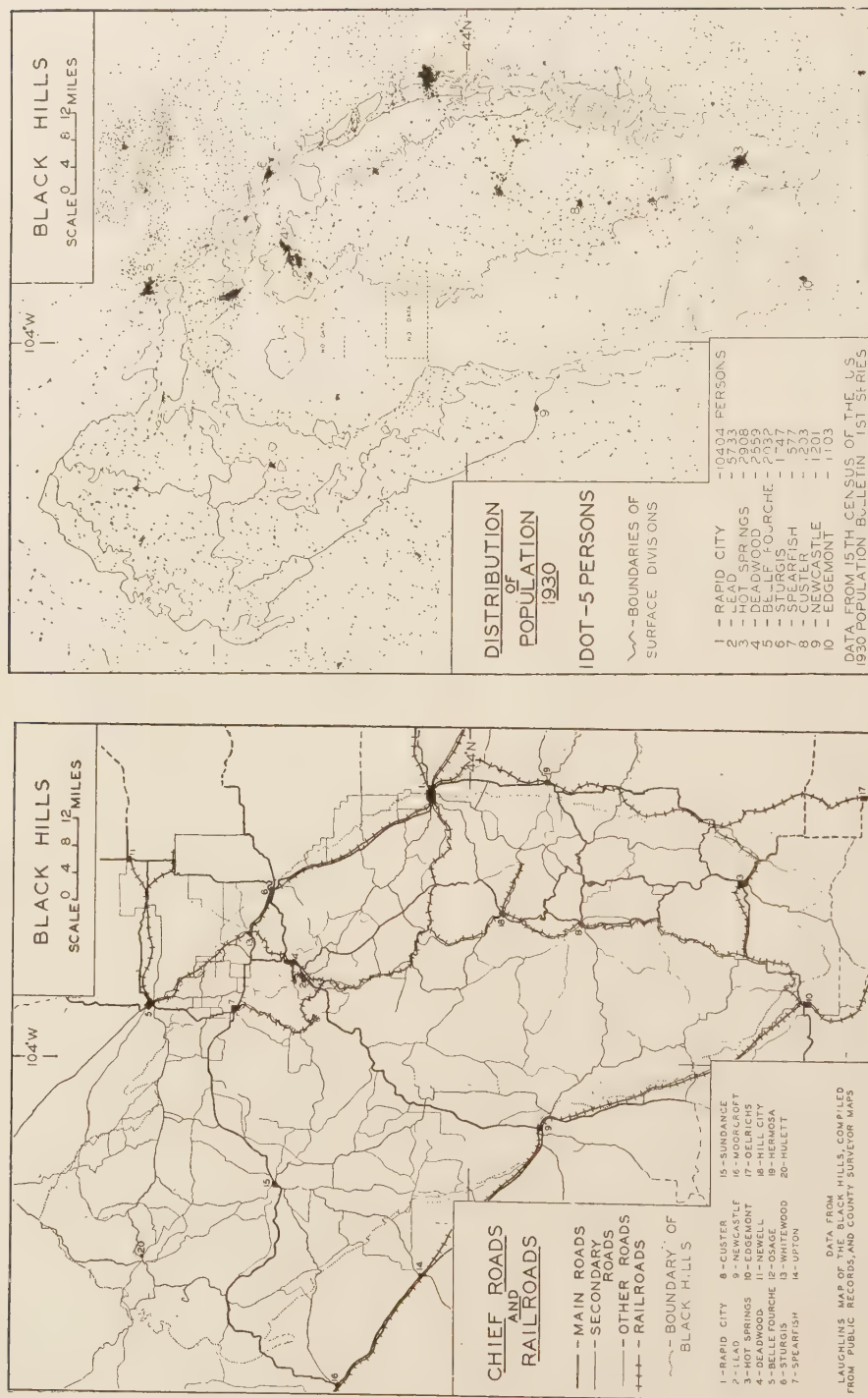
From 1920 to 1930 tourism assumed truly significant proportions, and nation-wide advertising, coupled with a series of "wet" years, attracted many to the Hills. With the development and improvement of roads the population increased rapidly in both rural and urban areas (Table II).

THE PRESENT DISTRIBUTIONS OF PEOPLE AND ROADS

The present pattern of population distribution has emerged from the flow of these fluctuating numbers over and around the features of the physical background. The larger population agglomerations are now at the chief commercial foci or at the mining centers. Of the 42,000 inhabitants within the Black Hills 29,000 live in agglomerations (Table III). The remainder of the population is widely dispersed (Map 18 B). In some parts of the Hills many miles separate the individual homesteads, and the distance is magnified by the difficulties of communication. The ultimate of this pattern of dispersal is the lone prospector living in his cabin in a secluded gully, or the solitary rancher who is content with his small plot of potatoes, a few head of cattle, and the lumber which his homesteaded land provides. This dispersed population is united with the population nuclei by roads which converge on the focal points and present a loosely woven mesh covering the surface (Map 18 A). Main roads, carrying more than average traffic, are graded and usually surfaced. These express the main arteries of travel, whereas secondary roads are traveled less frequently and are merely graded. The pattern is complicated by other roads of lesser importance, which are ungraded and are used only by the more dispersed population.

Within the Interior Basin the population has a total density of

²⁴ Visher, S. S., "The Geography of South Dakota," *South Dak. Geol. and Nat. Hist. Surv.*, Bull. 8: 139-162. 1918.



A

MAP 18

B

B. Areas with no data available have very few people. The placement of dots was controlled by field work, general knowledge of the area, and close study of the U. S. Geol. Surv. topographic maps

TABLE III

QUANTITATIVE ANALYSIS OF POPULATION DISTRIBUTION

Data based on planimeter readings of the Black Hills region (approximate)

Division	Area (in square miles)	Total population	Disseminated population	Disseminated density per square mile	Agglomerated population	Total density per square mile
Interior Basin.....	961.8	14,849	4,155	4.3	10,694	15.4
Limestone Plateau.....	1,521.2	2,277	2,230	1.5	47	1.5
Inner Lowland.....	661.0	20,537*	3,140	4.8	17,397*	31.1
Outer Rim.....	1,235.2	2,741†	1,540	1.2	1,201†	2.2
Upper Belle Fourche River Basin.....	377.1	1,550	1,450	3.8	100	4.1
Uplands of Tertiary deposition.....	50.8	75	75	...	.....	...
Isolated hills and peaks formed from Tertiary intrusions.....	59.3	.....	.....	...	.....	...
Total.....	4,866.4	42,029	12,590	...	29,439	...

* Includes Rapid City.

† Includes Newcastle.

Population data taken from maps compiled from statistics of the *Census of the United States*, No. 15, United States Department of Commerce, Bureau of the Census

15.4 per square mile, but outside the agglomerations the density per square mile is only 4.3 (Table III). There is a tendency toward concentration on the broad parks or in the narrow confines of deep valleys. Mining clusters have grown up in striking contrast to their scantily populated surroundings (Map 18 B). Roads reach the Basin by direct routes across the encircling plateau, and most of them are aligned north-south within the division itself. Generally speaking, they retain their routes within the valleys as much as possible, traversing the ridges only in order to reach adjoining valleys (Maps 16 A, 18 A).

On the other hand, the Limestone Plateau has a highly disseminated population, with a density of only 1.5 per square mile. Large areas are too high for successful cultivation, and much of the Plateau is relatively inaccessible. There is, however, a tendency toward concentration along the outer margin of the Plateau, where the slope is gentle and where the soil is derived from the Minnekahta limestone (Map 18 B). The alignment of roads is a reflection of their function of connecting the outskirts of the Hills with the population agglomerations of the Interior Basin.

Within the Inner Lowland marked population clusters are found on or bordering the flat areas of alluvium or, in a few areas, on the lower terrace deposits which can be used for agriculture. Small towns, foci for the surrounding ranchers, are located at points where the major streams cross the Lowland (Map 18 B). The predominance of an agglomerated population is shown by the fact that the total density per square mile is 31.1, whereas that of the dispersed population is only 4.8 per square mile. Main roads, which almost encircle the Hills, confine themselves to the gently rolling plain, southeast and west of the region, but traverse the Inner Lowland to the northeast, north, and south, where extensions of the Hills would otherwise cause marked deflection from the east-west line of travel and where easy access from the east is obtained by way of the water gaps. The road pattern, unlike that in the rest of the Hills, is rectangular at a few points within the Lowland (Maps 16 A, 18 A).

In contrast to the Inner Lowland the steeply sloping eastern portion of the Outer Rim is practically uninhabited, but to the west the broad valleys and flat-topped ridges are the sites of many ranches, which explain the population density of 2.2 per square mile (Map 18 B). The ranchers of this division are served by the small towns

of the Inner Lowland or by those on the adjoining plains. Most of the chief roads cut transversally across the Outer Rim, following either the valleys or the ridge tops.

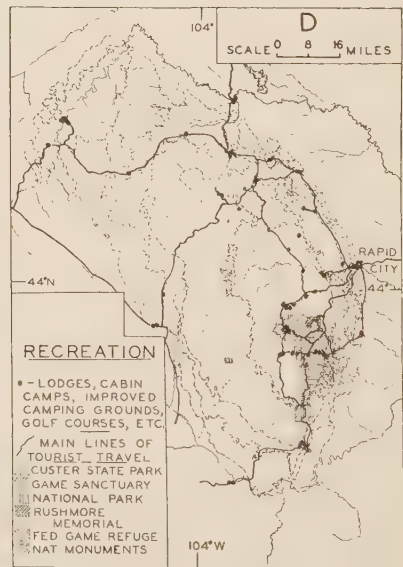
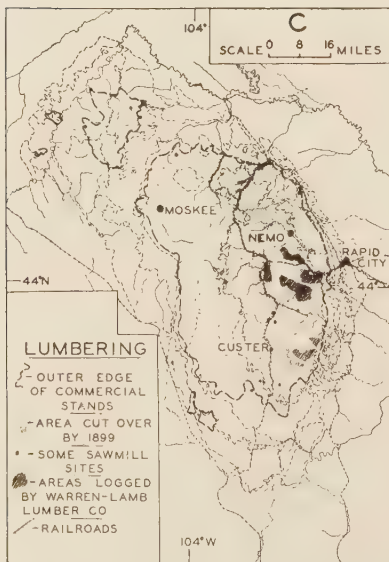
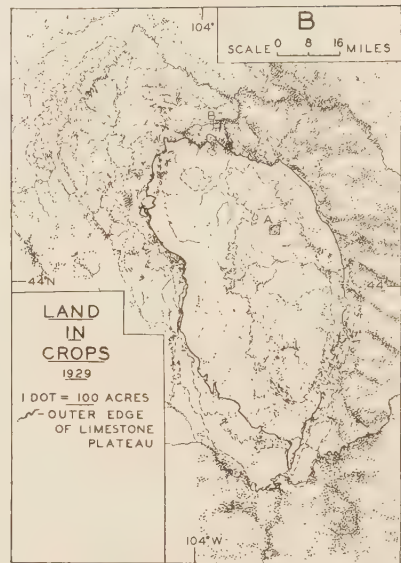
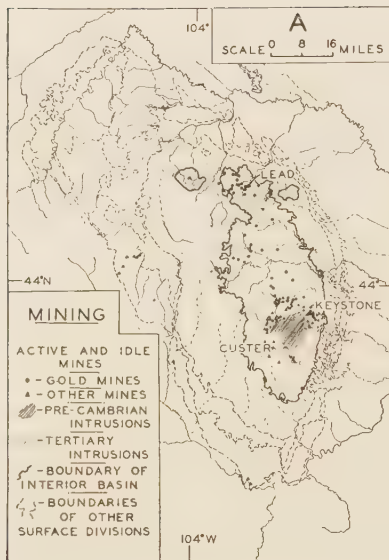
In the Upper Belle Fourche River Basin the majority of the ranches are in the valleys. The focus of the area is Hulett (Map 18 B). It is toward this center that the roads converge. Finally, on the Uplands of Tertiary deposition there are a few ranches where water is available and the soil suitable for agriculture.

Beyond the outer margin of the Hills the scarcity of water and the character of the soil results in a concentration of habitations along the streams or near the water supply offered by artesian wells. The marked concentration of the rural population east of the region may be correlated with the abundance of water descending from the Hills and with the existence of terrace deposits which cover the gumbo clay. The effect of the Government irrigation project east of Belle Fourche is seen on the map of population distribution (Map 18 B). Rectangularity of road pattern on the plains is common, but a general convergence of routes toward the main entrance towns of the Black Hills is discernible (Map 18 A).

Concentration of agglomerations in the eastern portion of the region is associated with several facts: it is here that the mines are located; water is abundant; the main tides of settlement advanced from the east and south; markets lie to the east; and railroads lead in that direction. A striking correlation between the distribution of railroads and population centers is apparent. Towns distant from the railroads are showing definite signs of retrogression, whereas Rapid City at the railroad focus of the region is the largest agglomeration of the Hills.

THE MODES OF OCCUPANCE

Four modes of occupance have reacted on the regional scene mining, ranching, lumbering, and recreation. Though there has been, as we have indicated, something of a succession of these modes in time, yet all of them survive and are still active in one part or another of the Hills. Each group of people, with its individual mode of occupance and in accordance with its own necessities, has sought out and utilized quite different elements of the physical background. One has made use of the rich ores; another, the plentiful supply of timber; another has brought about the settlement of areas favorable



MAP 19. For explanation of maps see bottom of opposite page

for agriculture; and still another has recently developed the utilization of recreational advantages offered by the Hills.²⁵ Several distinct patterns result. Each of these is a generalization of the distribution of the specific forms resulting from one mode of occupation. Yet from the blending of all these patterns impressed upon the physical background emerge those qualities and characteristics which give individuality to the occupation of the region. In other words, the unity of occupation within the region may be resolved into its component parts.

Mining

Mining is concentrated within the Interior Basin, where mineralized zones occur in close association with igneous rock which has been intruded into the pre-Cambrian or early Paleozoic rocks. The massive granite and associated pegmatites in the southern Hills are of pre-Cambrian age themselves. However, in the northern Hills many of the mineralized zones are related to Tertiary intrusions (Map 19 A).²⁶ Of relative insignificance, coal mining was concentrated within the Outer Rim near Cambria and Alladin (Map

²⁵ Van Royen treats the occupation of the Black Hills under somewhat similar groupings. See Van Royen, W., "De 'Black Hills' van Zuid-Dakota. Een sub-humied Eiland in een semi-ariëd Gebied," *Tijdschr. v. econ. Geographie*, 23: 177-188. 1932.

²⁶ Emmons, W. H., "Relations of Metalliferous Lode Systems to Igneous Intrusions," *Am. Inst. Min. and Met. Eng., Trans.*, 74: 33. 1926. See also Connolly, J. P., and O'Harra, C. C., *The Mineral Wealth of the Black Hills*, *Bull.* 16: 270. South Dakota School of Mines, 1929.

EXPLANATION OF MAP 19

- A. Data from J. P. Connolly and C. C. O'Harra, *The Mineral Wealth of the Black Hills*, *Bull.* 16 (South Dakota School of Mines, 1929); J. D. Irving, *Economic Resources of the Northern Black Hills*, *U. S. Geol. Surv., Prof. Paper* 26 (1904); V. Ziegler, "The Mineral Resources of the Harney Peak Pegmatites — I," *Mining and Scientific Press*, 108 (1914): 604-608; E. P. Rothrock, "Mineral Producers in 1929," *Report of Investigations, No. 1*, South Dakota Geol. and Nat. Hist. Surv. (1930); J. M. Hill, *The Mining Districts of the Western United States*, *U. S. Geol. Surv., Bull.* 507 (1912)
- B. Placement of dots controlled by field data within the Black Hills, and from general knowledge and with the aid of the folios of the U. S. Geol. Surv. outside the region
- C. Data from H. S. Graves, "Black Hills Forest Reserve," *U. S. Geol. Surv., Annual Rep.*, Part 5 (1899); A. B. Hood, "Logging Operations in the Black Hills," *The Black Hills Engineer*, 16 (1928): 120-135; National Forest General Maps of the scale 1: 125,000

16 A). A horizon of bituminous coal occurs at or near the base of the sandstone formations underlying the cuesta.²⁷

The impress on the landscape of the Black Hills by mining is now partly erased, for the majority of the mines, mills, and railways lie idle or have been completely abandoned. As late as 1904 there were forty-eight lode mines producing gold, silver, and lead. By 1910 the number had fallen to eighteen. In 1930 only two were actually in operation.²⁸ One was the Homestake mine, the largest producer of gold in the United States. The other was a smaller working on claims at Keystone. Mines yielding metals other than gold have experienced very irregular activity, but several small mines in the vicinity of Keystone are being worked at present.

The impresses resulting from this mode of occupancy are many. In 1904 Jaggar stated that "railway branches and loops are now so numerous in the mining district as to form a conspicuous artificial feature of the topography; the same may be said of the innumerable tunnels and prospect holes with their dumps jutting out from the steep gulch slopes, the size of the dump an index to the depth of the digging."²⁹ At present these features remain merely as mute evidence of former widespread expansion and subsequent decline. Many abandoned mining towns, such as Rochford, Galena, Terry, and Trojan, enhance the impression of decadence (Pl. LXXVIII, Fig. 2). Lead, however, is outstanding as an active mining center, for the Homestake properties are concentrated in its eastern section and present a truly complex industrial scene. The town itself has been narrowly restricted by the valley sides, where the houses, rising above one another, overlook the commercial area (Pl. LXXX, Fig. 1).³⁰

Placer mining, which had ceased in 1930, has since then rapidly increased. In 1931 eighty-three claims were being worked.³¹ However, the effect upon the landscape is slight. The dispersed popula-

²⁷ Stone, R. W., *Coal near the Black Hills in Wyoming and South Dakota*, *U. S. Geol. Surv., Bull.* 499: 1-64. 1912.

²⁸ Henderson, C. W., articles on gold, silver, copper, lead, and zinc in South Dakota and Wyoming, in various numbers of *U. S. Geol. Surv.* through 1923; continued as annual reports by the U. S. Bureau of Mines, *Mineral Resources*, Part I — "Metals."

²⁹ Jaggar, *op. cit.*, p. 16.

³⁰ Guthe, O. E., "Lead and Rapid City," *Pap. Mich. Acad. Sci., Arts and Letters*, 18 (1932): 143-149. 1933.

³¹ Henderson, *op. cit.*

tion at one time dependent on this activity has now been replaced by ranchers.

Ranching

The ranching pattern, as indicated by the distribution of crop acreage, is totally different from that of mining. Crop production is concentrated beyond the outer edge of the Limestone Plateau on the relatively level areas of the Inner Lowland and the adjoining plains, particularly on the broad alluvial flats where rich soils can be irrigated. The more rugged surfaces of the Outer Rim, the Plateau, and the Interior Basin remain today only sparsely settled by ranchers (Map 19 B).

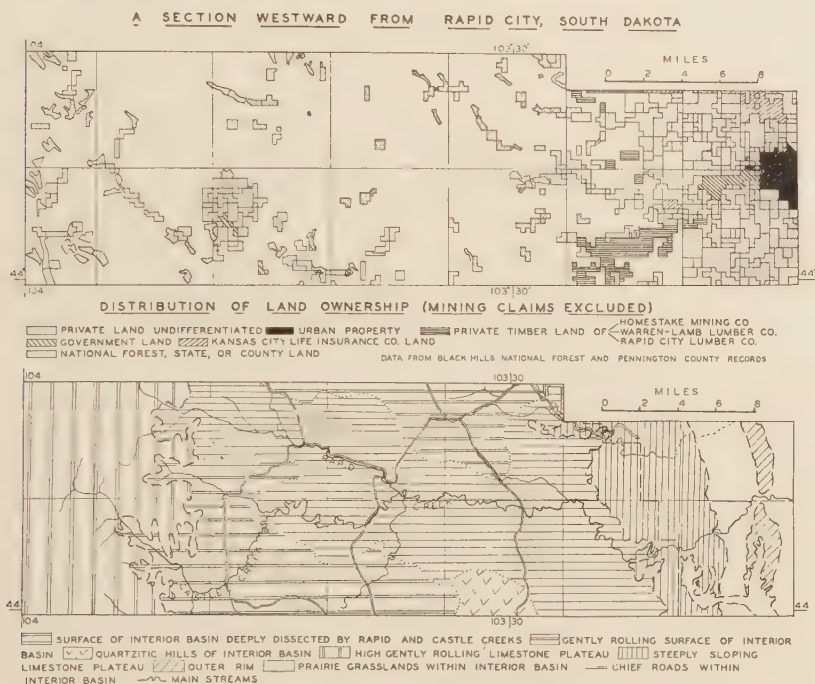
There are three chief types of ranches in the Black Hills: the first has a large portion of its crop land under irrigation; the second is the large ranch with extensive fields of grain, from which a surplus is obtainable when the market is favorable; and the third is the small ranch, where only forage crops are grown, with occasional plots of potatoes. Transitional types can, of course, be recognized. Nearly all these ranches involve the raising of stock — beef cattle or sheep on the majority of the ranches, but with an increasing specialization in dairy cattle on the irrigated lands near the larger towns.

The ranches dependent on irrigation are localized on the broad alluvial flats of the major streams which flow out of the Hills. The most noticeable concentration of them is on the eastern and north-eastern sides of the Hills, where permanent streams are found. Spearfish Valley is the outstanding center for this type of ranching. These ranches are not limited to the Hills, but extend to the plains.³² Irrigated fields are dominant and produce forage crops, such as barley, corn, and alfalfa, and also wheat and oats (Map 20 B; Pl. LXXVII, Fig. 2). Small fields of vegetables, fruit, and sugar beets are also grown. Apples are the chief orchard crop; sugar beets furnish part of the supply for the Utah Sugar Refinery at Belle Fourche. The irrigation projects within the Hills are privately owned, individually or coöperatively. For instance, there are nine leads from Spearfish Creek, and ten or twelve ranchers coöperate in using one ditch.

The large ranches with extensive unirrigated fields of grain occur on the better sites for agriculture, on the outer margin of the Lime-

³² Present and proposed irrigation projects and power developments for this region are discussed in *Cheyenne River, South Dak. and Wyo., U. S. 72d Congress, 1st Session, House Document No. 190 (1932), map 11.*

A marked concentration of such tracts is noticeable on the prairie grasslands and in the parks of the more gently rolling surfaces of the Basin. The deeply cut valleys of Rapid and Castle creeks are avoided, but the more rolling surfaces near the eastern part of the Basin are settled, and there seems to be a distinct tendency to locate



MAP 21

adjacent to the main highways. On the ranches of this third type a large portion of the grass is cut for hay, but fields of oats — the dominant grain crop — are interspersed in many places, while potatoes are the money crop. The ranch buildings, not uncommonly constructed of logs, stand at the base of the bordering slope, separated from the fields by the road (Map 20 A; Pl. LXXVI, Fig. 2).

The grazing area is widespread throughout the region and includes timbered and scrub lands as well as grasslands. Grazing of cattle on the open range was formerly a thriving industry, but now, with the passing of this range, the rancher has recognized the ad-

vantages offered by the National Forest Service. Stock is driven into the Hills every summer and is run on assigned units. At the end of the season the cattle are gathered together at shipping points located along the railroads, for most of them are taken to Sioux City and Omaha as feeders. The railroad utilized depends upon relative accessibility and rates. Sheep are secondary in importance and are restricted within the national forests to a few units, but they are extensively grazed on the plains outside the region.

Lumbering

Lumbering, although permanent as an industry within the Hills, is restricted to the area of commercial timber, but presents an ever-changing distributional aspect (Map 19 C). As the cutting proceeds from gulch to gulch the portable sawmills are moved to new working locations, and even the large-scale lumbering activities of the Warren Lamb Lumber Company progress from drainage basin to drainage basin as the available timber is cut. In 1926 there were fifty sawmills within the Black Hills region.³³

Scrubby second growth and large burns give evidence of a rapid forest exploitation during the first years of settlement (Map 19 C). Most of the timber was used in the mines, in the wooden buildings of the towns, and in the construction of numerous railroad lines. Since 1898 timber cutting has been regulated by the National Forest Service, and it is managed on a sustained-yield basis, which gives permanency to the industry.³⁴

The settlement forms resulting from the lumbering industry are multiple and are concentrated within the more accessible portions of the forested area. Abandoned small sawmill sites can easily be recognized by the large piles of sawdust at the mouths of gulches, the slopes of which have been visibly thinned out. At other points the operating mills are seen. Logs decked in the woods are a common sight. These are awaiting the trucks to take them to the mill.

The distribution of the smaller mills is determined largely by the practice of the Forest Service of dividing the area into working circles tributary to definite shipping points. These circles are further

³³ Beardshear, W. D., "Lumbering in the Black Hills," *The Black Hills Engineer*, 14: 177. 1926.

³⁴ Duthie, G. A., "Timber — an Economic Resource of the Black Hills," *The Black Hills Engineer*, 16: 108-109. 1928.

divided into logging units. Each logging unit takes in the drainage basin of a small tributary of one of the larger streams of the Hills. The Forest Service allows logging only on those units which are suitable.³⁵ Since the stands of timber suitable for cutting are scattered, the lumbering activity at any one time is also very scattered within the forests.

The lumbering activities of the Homestake Mining Corporation are centered around the two camps of Nemo and Moskee (Map 19 C). A large mill has been erected at Nemo, which has been an established lumber camp for thirty-five years. It is now a small thriving town, dependent on the activity of the mill. For many years a railroad was maintained in operation between Lead and Nemo, but now motor trucks are in use. No town has grown up at Moskee, which is secondary in importance to Nemo. In 1925 these two sawmills produced about nine million feet BM.

The Warren Lamb Lumber Company is the largest operator in the Hills, and in the same year produced seventeen million feet BM.³⁶ Its mill is located on the northwestern edge of Rapid City, easily accessible to the railroads (Map 19 C). The first logging operations of the predecessors of this company began in 1908. Since then the company has logged, in succession, the drainage basins of Victoria Creek, Deer Creek, Galena Creek, Bear Gulch, Slate Creek, Spring Creek, and now Horse Creek (Map 19 C). All these areas lie on the eastern side of the Hills and were made accessible by the construction of temporary railways.³⁷ The railway into the Horse Creek area is still in use. Migration of activity is, then, the essence of this mode of occupation.

Paradoxically enough, this constant movement of logging operations results in greater permanency of other forms within the Hills. Custer, which was in a stage of decadence after the decline of the mining industry in its vicinity, has now become a relatively prosperous town, largely dependent upon the continuous lumbering activities of the working circle for which it forms a center (Pl. LXXX, Fig. 2). The Nemo working circle serves Nemo in a like manner. Otherwise the visual results of lumbering will probably continue to

³⁵ The Black Hills National Forest and Harney National Forest Records.

³⁶ Beardshear, *op. cit.*, p. 175.

³⁷ Hood, A. B., "Logging Operations in the Black Hills," *The Black Hills Engineer*, 16: 120-135. 1928.

appear at new points, mark the immediate landscape for a time, and then later slowly blend with the surroundings.

Recreation

Recreation has also tended to retard decline in many parts of the Black Hills. The material forms of tourism are definitely concentrated along the main highways in the eastern portion of the Hills (Map 19 D). Here the wooded slopes and the clear, flowing streams form a pleasing contrast to the hot, dry plains in summer. Rugged scenery and historical points of interest are also found. Rapid City is the center of this recreational activity and forms the gateway for those entering from the east. It is from this point that tourist travel radiates into the Hills proper. They lie in an advantageous position between the eastern centers of population and the parks of northwestern United States, and graded roads break away from these through routes and invade the interior, only to meet them farther on. In this way the impatient tourist experiences but a slight interruption in the continuity of his travel.

For many years the tourists were carried through the Hills primarily by trains. With the improvement of highways and the increase in motor travel there was a definite shift within the Hills from a concentration along railroad lines to a concentration along highways. In 1924 nearly 30 per cent still came by train. In 1930 about 95 per cent drove automobiles.³⁸ With the change in the mode of travel the natural recreational resources of the region increased in value as a result of greater accessibility.

Graded roads, hotels, lodges, cabin camps, forest trails, golf courses, and many other improvements for the accommodation of this transitory group are seen on all sides. The state and national forest and park services combine in their policy of maintaining such features. Custer State Park is the largest state park in the United States, and includes some of the most scenic features of the Hills (Map 19 D; Pl. LXXVI, Fig. 1). The inclusion of Harney Peak and the surrounding heights within the park was a result of the creation of the Custer State Park Game Sanctuary from some of the lands of the Harney National Forest.³⁹ The Meade Federal Game

³⁸ Harney National Forest Records.

³⁹ Torrey, R. H., *State Parks and Recreational Uses of State Forests in the United States* (Washington, 1926), pp. 231-234.

Refuge west of Sturgis is partly responsible for the preservation and propagation of the game life within the region. The Federal and state fish hatcheries at Spearfish and Rapid City supply many thousands of rainbow, brook, and black-spotted trout to the larger streams each year.⁴⁰ Unique attractions under governmental control are Wind Cave National Park, Jewel Cave and Devil's Tower national monuments, and, more recently, the Rushmore Memorial (Map 19 D).

These features, to which might be added many other points of interest to the tourist, are individually of little significance as a part of the areal scene, since each is unique in the area. On the other hand, as an aggregate they have directed the spread of recreational activity and its associated forms within the region.

From the blending of the patterns recognized in the preceding analysis the unified whole of the cultural impress is seen in all its complexity. This complexity is functionally exemplified in Rapid City, which has grown into the largest urban center of the Hills (Pl. LXXIX, Fig. 2). It serves its territory in many ways, all of which are noted in the urban scene. Of outstanding importance is the commercial function, for Rapid City is a point upon which routes converge. Its trade area includes the entire Hills and the adjoining plains. Mining is reflected in the State School of Mines; ranching in the flour mills and creameries; lumbering in the Warren Lamb lumber plant; and the recreational activity in the several large cabin camps and camping grounds, as well as in hotels, which are far too impressive for the actual size of the city.⁴¹

CONCLUSION

These types of economic activity and the design given to the areal scene of the Black Hills by the union of the patterns of the physical background with those of the occupance result in a recognized unity — an insular quality which definitely separates this region from the expanse of the Northern Great Plains.

The gross features of the mold, recognizable in the major lineaments of the surface, seem to dominate the patterns of the other elements of the areal scene. The general patterns of the soil, the

⁴⁰ Booth, D. C., "Fish Culture in the Black Hills," *Pahasapa Quarterly*, 1, No. 4: 16-17. 1912.

⁴¹ Guthe, *op. cit.*, pp. 150-155.

forests, the grasslands, the population distribution, and the roads, for example, conform to the major expression of the mold. Each mode of occupancy has brought an individual pattern of forms associated with it. Mining is concentrated within the Interior Basin. Ranching reaches its best development on the outskirts of the Hills. Lumbering, less restricted than mining, has expanded from the Interior Basin to the Limestone Plateau. Recreational features alone deviate from the major lineaments.

The drainage pattern, on the other hand, reveals the minor irregularities of the mold and forms the skeleton in relation to which the details of the landscapes align themselves. The valley parks of the Interior Basin and the irrigated alluvial flats of the Inner Lowland, for example, conform with the drainage lines, but are diametrically opposed to the alignment of the gross features.

These major and minor lineaments bring out separate distributions which, blending together, create the regional design of the Black Hills.

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PLATE LXXVI



FIG. 1. An aerial view of the Harney Peak district. This type of surface is one of the most rugged in the Black Hills region. The bare faces of massive granite outcrops are prominent



FIG. 2. A characteristic park within the Interior Basin. The surface shows the moderate relief of late maturity. The typical zonation of vegetation can be seen partly developed. The native hay in the foreground has just been cut. The road follows along the base of the ridge just to the right of the view. Photograph taken looking northwestward in the valley shown on Map 20 A

PLATE LXXVII



FIG. 1. A gorge cut into the Limestone Plateau. Evidence of recent burning can be seen. Photograph in the burned-over area southwest of Spearfish



FIG. 2. A view of some alluvial flats within the Inner Lowland. In the background are flat-topped hills capped by terrace deposits on the hilly surface of the Lowland. The stream is bordered by cottonwood. A field of corn is on the left and a field of barley on the right. Photograph taken looking southward over the area shown on Map 20 B

PLATE LXXVIII

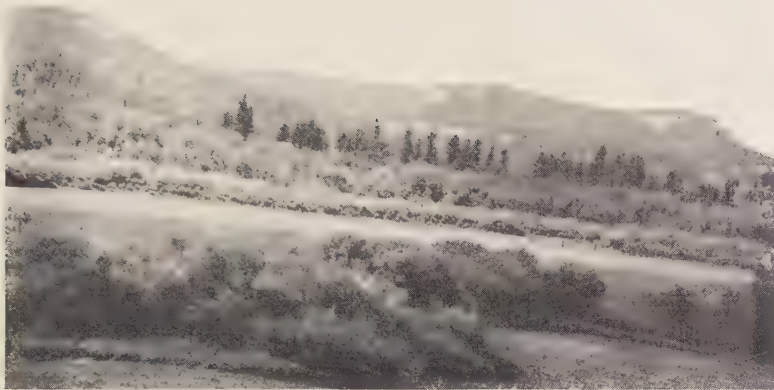


FIG. 1. The valley of Castle Creek at the inner edge of the Limestone Plateau. The limestone escarpment appears in the background. Here is an excellent example of the zonal arrangement of vegetation. A small tributary in the foreground is lined with willow. The main stream in the center is similarly indicated. The intervening area is meadow grass and is cut, as seen in the foreground. Aspen covers the lower slopes. Some pines are seen, but stands of spruce cover the north-facing slopes



FIG. 2. The mining town of Rochford, now practically abandoned. It lies in the valley of Rapid Creek within the Interior Basin

PLATE LXXIX



FIG. 1. Abandoned ranch buildings located on the side of a shallow valley within the forested area. An early type of structure, with log construction and characteristic chinking, is shown here



FIG. 2. An aerial view of Rapid City, looking eastward

PLATE LXXX



FIG. 1. A view of the commercial and residential sections of Lead, looking northwestward. The Homestake mills are to the right of the view



FIG. 2. An aerial view of Custer, looking westward. The grassy valley parks in the background are characteristic of this part of the Interior Basin. The rectangularity of the street pattern is unusual for towns within the Basin

